

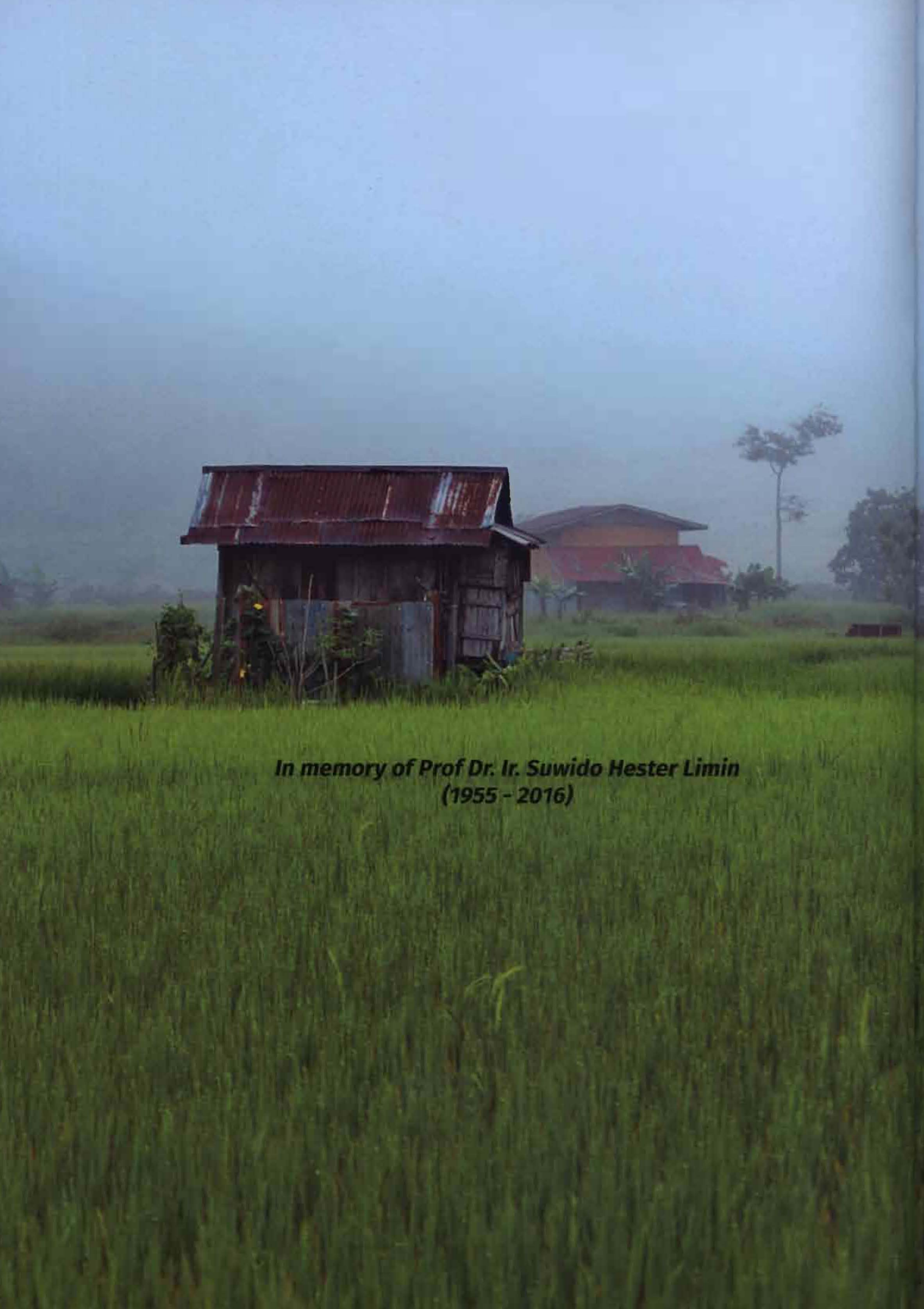


HANDBOOK

for ICT Projects for RURAL AREAS



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*In memory of Prof Dr. Ir. Suwido Hester Limin
(1955 - 2016)*



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Handbook for ICT PROJECTS for RURAL AREAS

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ASIA-PACIFIC TELECOMMUNITY

APT serves as the focal organization for information and communication technology in the Asia-Pacific region. We promote the development of telecommunication & ICT in the region, with particular emphasis on developing countries.

APT Work Programme is developed to cater for the needs of its members and areas of common interest of the Asia-Pacific region. These include Policy and Regulation, Radiocommunication, Standardization, Human Resource Development (HRD), Infrastructure Development, etc.

APT also assists its members in the preparation of ITU conferences such as Plenipotentiary Conference, WRC, WTDC and WTSA.

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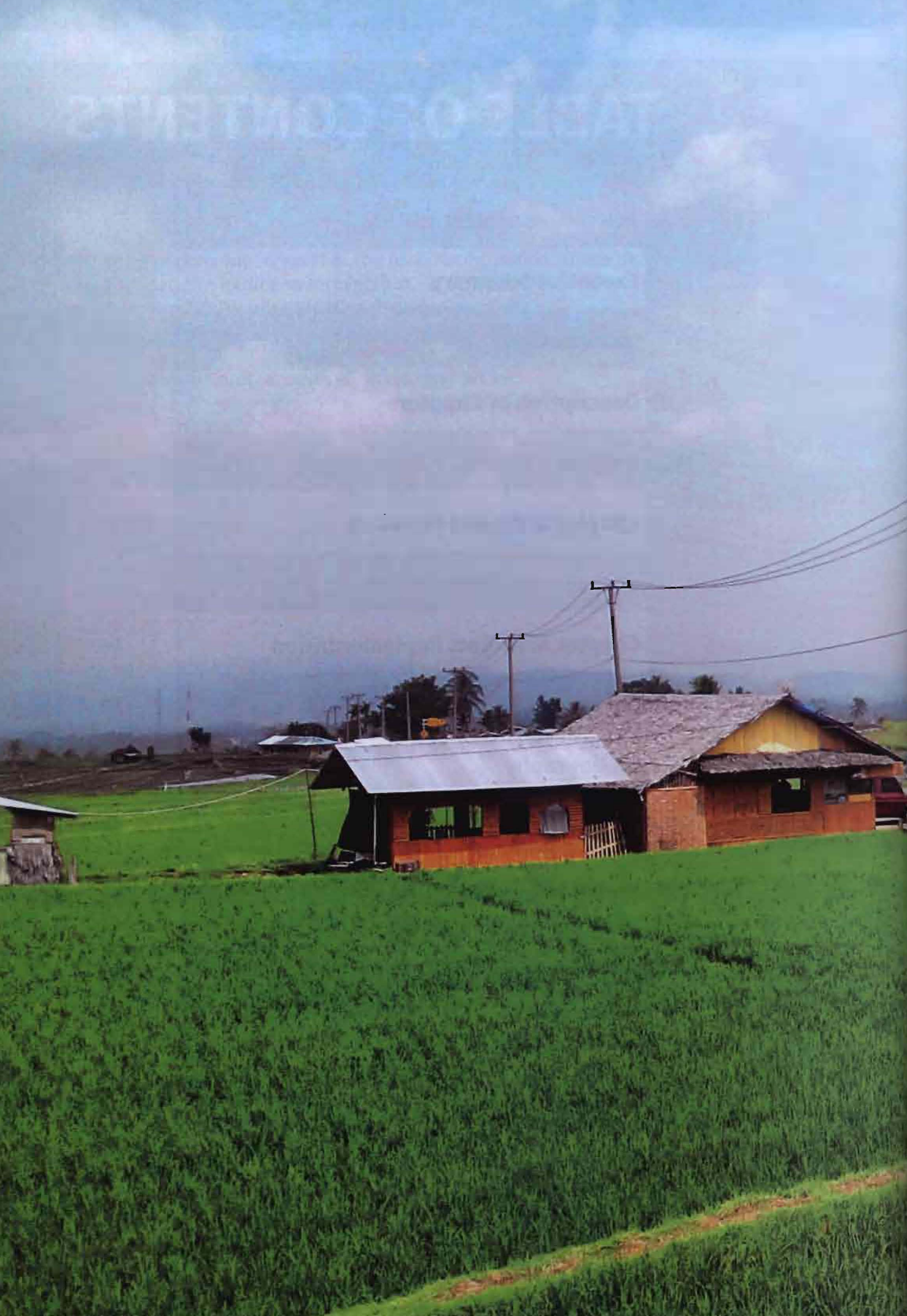
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Let's SHARE together! Welcome to this new activity.

The role of SHARE is very simple but important; that is to bring Success and Happiness by Activating Regional Economy especially for communities living in rural locations within developing countries.

Success and happiness can be achieved through the improvement of the quality of lives and socio-economic status of rural communities. However, one very important question that must be asked is how can this improvement be achieved? Although many trials with high technologies have been conducted over the years, these attempts can be seen to have been made in vain, for the simple reason that these trials were driven by technologies instead of being people-centric. Little attention was paid to the thoughts and concerns of the beneficiary communities who were to continue creating value to these projects themselves. Considering that the lives, situations, environments and customs of everyone are all different, it is therefore our responsibility to design, adapt and operate technologies and systems to best fit the needs of each person and society in an easy and sustainable way. Our past experiences and observations have shown that easy and sustainable operation is the key success factor in rural areas.

What makes SHARE stand out from other ICT driven projects is the idea of collaboration instead of competition. SHARE members work closely together in sharing their experiences and results of the various projects initiated in their respective countries, highlighting how ICT solutions are applied in different situations. Through these shared know-hows, we can then move forward in achieving greater heights with the beneficiary communities that we will work together with in the future.

Let's SHARE our experiences and achieve our roles together!

Dr. Yuji Inoue

Executive Advisor, The Telecommunication Technology Committee
Chairman, Toyota Info Technology Centre



JAPAN

e-Aquaculture
The Philippines

CyberBrain, Pattaya Protocol
Thailand

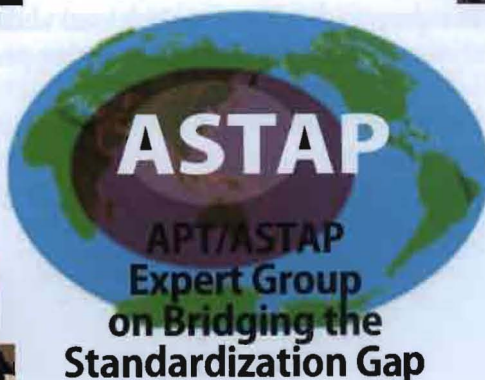
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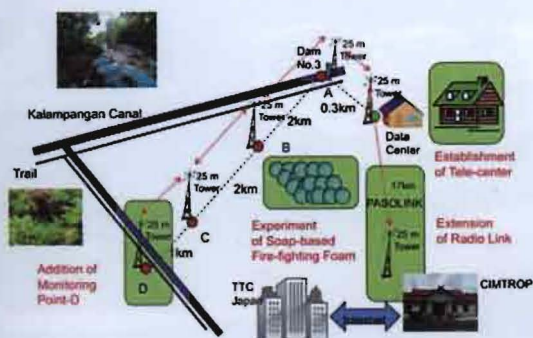
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Indonesia

e-Environment
Indonesia

■ Educational Solution e-Learning



■ Environmental Solution Monitoring Peat Fires for CO₂ emission reduction



■ Healthcare Solution e-Healthcare and e-Local Community



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The authors hope to share knowledge and lessons learnt from the various projects conducted in the Asia Pacific in the last ten years, through the contents presented in this handbook, and that this handbook will help to promote, improve and expand future implementations of ICT projects for rural communities all over the world.



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Professor Dr. Gregory Tangonan has had 32 years of R&D experience with Hughes Research Laboratories. He retired in 2003 as Director of Research with responsibilities for Innovation Strategy and conceptualization and execution of Research Programs with collaborators worldwide and is an expert in a wide variety of fields like fiber optics, wireless communications, material science, and laser applications. He has twice won the prestigious R&D 100 Award, in 1996 for all-optical switching modules that were developed for the world's first demonstration of large scale all-optical networking and the second R&D 100 Award was in 1989 for secure fiber optic systems that can detect intrusions into the fiber while transmitting clear data. Dr Tangonan joined Ateneo de Manila University as Professor in the School of Science and Engineering and is the Founding Director of the Ateneo Innovation Center. He is presently the Executive Director of the Commission on Science and Technology and Engineering for the Philippines.



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Professor Dr. Ir. Suwido Limin was longtime University of Palangkaraya professor who founded a firefighting brigade to fight in the field during the haze crisis in Central Kalimantan. In his life, Suwido was known to be very dedicated to peatland conservation. The Director of the Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP), he was also most vocal about the threat of forest fires and peatland issues in Central Kalimantan. Dr. Limin, an ethnic Dayak, also helped draft a regulation on indigenous rights in Central Kalimantan that has been submitted to the provincial government for approval.



EXECUTIVE SUMMARY

Introducing technology in general to groups of people who are marginalized by social, economic and geographical gaps is a complex task. Technology, particularly those that involve the communicative and collaborative features, can be a challenge for rural communities to adapt to, because the tools are designed, disseminated and targeted for those who already have an affirmative uptake to technology. For communities living in rural areas, the use of technology is often perceived to be a “want” rather than a “need”, as local knowledge and social and economic practices that exist in communities living in rural areas are most often self-sufficient, inherited for generations, and readily transferable through mentoring.

Bridging the digital divide, or technological gap between urban and rural communities, is an effort that has been fronted by many nations, organisations and agencies alike. To date, there have been various projects implemented worldwide which aim to address this issue. ICT access has been identified by the International Telecommunication Union as being crucial in bridging the digital divide as a key foundation of development, particularly for rural development (ICTs Go Rural, n.d.). The creation of local capacity and competencies, and the stimulation of ingenuity and innovation, and consequently the boost of human skills and performance are critical factors in connecting rural communities to the advancements in global information and communication network.

The “Success and Happiness by Activating Regional Economy” (SHARE) collaboration is an example of such initiative. Fronted by the Telecommunication Technology Committee (TTC) Japan, SHARE has implemented various ICT projects in rural locations in Asia Pacific, particularly in Malaysia, Indonesia, Thailand, the Philippines and Vietnam. The main philosophy behind the SHARE initiative is simple but important, namely to bring about positive changes in the development of rural communities, increasing socio-economic standing and improving the quality of life of the rural folk through activating regional economies using various ICT solutions. The SHARE collaboration’s strength is through its partnership with many countries. Collaboration is built with academics in local universities, and local government agencies that are able to directly influence change in rural communities in their respective countries.

A key observation that has been made from the implementation of the different SHARE projects is that, although ICT is imperative towards driving the initiative forward, a crucial factor in ensuring that these changes continue to develop is the commitment of the communities themselves. Input from the communities is vital to create value for the projects. It was also observed that each project benefits best when customised to suit the local needs, context and customs of each community. Every community is unique, and one implementation model does not fit all projects. Project initiators have had to design, adapt and operate technologies and systems that can best fit each person and society in a straightforward and sustainable way.

This handbook is intended to guide future initiatives to introduce ICT projects for rural communities. The handbook is written from an accumulation of experience of technologists and academics from six countries in Asia Pacific. The collaboration of ideas shared in the handbook provides a broad spectrum of concerns that have emerged through the planning and implementation of ICT-based projects, funded by Asia Pacific Telecommunity (APT), beginning 2008 to 2016. The research focus of APT to “promote the development of advanced ICT researchers and engineers in the Asia-Pacific region by the exchange of personnel through international collaborative research projects on advanced ICT” (J2-J3-TMP, 2016).

All projects have their own stories, and each story became a lesson learned. The handbook builds on the stories, and its intention is to empower others who are making their own journeys in introducing technology, particularly ICT, to rural areas.

The projects implemented were pilot initiatives, in that their duration was limited to only one calendar year. Impact on the rural communities may not have been as substantial as it is designed for; however the lessons learned from each project opened new ways of thinking and exploring ways to introduce ICT for rural areas. The handbook concludes with ideas that encompass the growth of scholarship about ICT for rural communities, paving the way for future projects in the field of community informatics.

INTRODUCTION

This handbook presents guidelines and fundamental requirements that can be used by project managers and teams who are keen on initiating ICT projects in rural areas. Contents are based on the experiences by the authors when rolling out ICT projects in remote areas within Asia Pacific. The handbook is an accumulation of ideas and experiences from SHARE projects, an initiative driven by Telecommunication Technology Committee Japan (TTC) Japan, in which four countries, namely Malaysia, Indonesia, Thailand and the Philippines, have rolled out various technology-based projects in rural locations and Southeast Asia. The book describes a narrative of guidelines, which are organised according to phases of development for a technology-enabled solution. The writing of the handbook takes into account the unique considerations for accommodating to local needs and competencies in remote and rural communities. The handbook is written from a project management approach. The contents are arranged in a sequence that would help a new or experienced project manager to visualise the work processes needed in planning, implementing and assessing a project that capitalizes on ICT for rural communities.



Technology has become such an essential part of society today, with the latest advancements in idea and product development that continue to enable better efficiency. However, the convenience of technology has not reached out to everyone around the globe, as many rural communities are still placed at a disadvantage due to remote geographical locations and the lack of access to necessary infrastructure.

Bridging the digital divide has captured the attention of many researchers and technology providers alike, and there have been an increasing number of efforts to introduce ICT projects to numerous rural communities around the world, especially in the Asia Pacific region (UNESCO BANGKOK, 2005). However, working with rural communities entails more than just bringing in the technology and installing it in the village and expecting the community to agree, accept, adopt and adapt the innovation that comes with the technology introduction.

In the experience of SHARE, three main players make the technological innovation work in a community – the technology providers, the beneficiary community, and the research and development team who are identified from local universities. Each player has its own strengths that would enable the technology project to run. Synergy between the players is vital towards the success and sustainability of an ICT project. This can be achieved through effective communication, to ensure mutual understanding of the objectives and expected outcomes of the project. What is interesting to note is that even though close communication is a crucial part of running a project, this aspect is not always given top priority. On the outset, the three players seem to play separate roles and are responsible for their own individual outcomes. However, the three roles are highly dependent on one another throughout the various phases of an ICT project. For example, although the technology drivers are responsible for bringing in the technological solutions to the community, they need input from both the researchers and the community in order for the technology to be relevant to the needs of the beneficiary community. The researchers are needed to engage with the community to learn about what the communities want, and are able to support.

The information will determine how to best deploy these solutions to meet with their technological needs. The research teams are seen to take on a more central role in this process, as they will be the middle persons who will convey the thoughts of the communities to the technology providers, and vice versa.

Communities, on the other hand, are responsible for the articulation of necessary information to the other players in the project. The information will design the scope and nature of the ICT solution. Throughout the project, community representatives will also have to work closely with the project teams so that they will be able to take over the management of the project upon its completion.

On a more academic perspective, an approach to be considered as it can enable mutual beneficial relationships between project stakeholders is Participatory Action Research (PAR). Through PAR, rural communities take on an active role in the research process, becoming co-researchers and contributors towards the development and sustainability of the project. Besides that, researchers and technology drivers have the opportunity to see how they can further improve their solutions and deployment methods for the community through PAR. PAR also allows for all those involved in the project to not only build a close working relationship with one another, but to also lead towards a long-term commitment of confidence and trust with each other. It is this type of relationship between all the stakeholders that forms the core of every ICT project for rural areas, and is something which must be addressed and taken into consideration from the get-go of every project.

DESCRIPTION OF CHAPTERS

This section presents a brief description of each chapter created for this handbook. The section serves to assist readers to plan for what they read, to enable a more efficient access to contents of interest to readers.

Chapter One (1) describes the project initiation phase, where a project leader has to make early decisions about the scope and breadth of the intended project with a rural community. The chapter includes considerations for conducting a needs analysis, a feasibility study, and use the information collated to make informed decisions.

Chapter Two (2) covers tasks related to Planning. It explores issues related to the particular needs of the target rural community as identified in the first phase of the project. During this stage, project initiators will be able to plan and decide on suitable solutions that can be applied in the project, especially in terms of functionality, usability, availability, efficiency and sustainability. In the development stage, project leaders formulate the project activities that will be implemented in the project.

Chapter Three (3) looks at the systems design of a project, as systems design is an integral component to consider when initiating a project as there are various different requirements that need to be complied with in order to ensure that the chosen solution is suitable to meet with the needs of the target community. This chapter examines various aspects of systems design that project managers have to consider when planning to roll out an ICT project for rural communities, such as the needs of the community, the solutions that can be applied, the appropriate technology to be deployed and sustainability.

Chapter Four (4) essentially guides the implementation phase. At this stage, the actual implementation of the project is carried out as planned out during the design and development phase of the project. The implementation phase of the project rollout is important as project initiators will have to look at issues pertaining to the budget and scheduling of the project, as well as project sustainability. The chapter also looks at the management and monitoring aspect of an ICT project and the role of a project manager to monitor and address emerging issues in a timely manner. The chapter also summarises key tasks that need to be created and undertaken, to ensure a smooth and efficient hand-over of the ICT project to the rural community. It is the final step to verify the work processes in all phases in the project, which is crucial in determining the life cycle of the project to continue after the project concludes.

Chapter Five (5) is the final chapter in the handbook, which illustrates emerging trends and concepts related to introducing ICT projects to rural communities. A conceptualization of the Pattaya Protocol is described, detailing the growth of ideas by SHARE partners in designing projects for communities in rural areas. The Pattaya Protocol is an approach to be considered to move forward in the quest to integrate technology solutions efficiently for communities in rural areas.



PROJECT INITIATION

Every project begins with a need. A need is identified when it affects human social, economic, psychological and health aspects of living. When a need forms, a solution, or a combination of solutions is needed. One strategy to design a solution fit for the need is to initiate a project that focuses on addressing the nature of the need.

To pursue any type of project with communities in rural areas, there is a need to be prepared about the opportunities and challenges to be addressed, specific to the community. A project requires a leader and a team whom will create, manage and monitor the project. Oftentimes it involves individuals with various types of skills, qualifications, experience, and world view. As a team, they need to work on a timeline and a budget agreed upon for the project. There are several key points when planning a project, which involves a specific rural community. The questions can be categorized into three aspects – justification, significance, and role of ICT in the project:

Justification

- **What was the criterion used to identify the community to work with, for an ICT-based project?**
- **What are the characteristics of the community?**
- **What terms/points of reference are used to define the community as “rural”?**

Significance

- **What are the strategies used to collect and verify information on needs for the project?**
- **How will the community members contribute to the identification of needs of their community?**
- **Could working with the community create problems with other indigenous peoples in the region?**

Role of ICT in the project

- **What does this project offer that is new in terms of ICT?**
- **How and to what extent is the identification of knowledge base/ talents/ sources of reference will be identified to be relevant to the needs of the rural community?**



Choosing the community to work with, for an ICT project, is important in every community-based project. However, it is evident that there are more aspects to be considered when working with a rural community, in comparison to communities living in urban settings. Each rural community is unique from one to the other, due to geographical, economical, educational attainment or cultural ranges. It is therefore essential to consider the context in which the ICT project is proposed for. Project leaders should consider these unique factors when planning to initiate a project in rural settings, as each project has its own impact and kinship to its target community. The specific needs of the community as well as the problems that they face must first be addressed before any solution can be proposed for installation.

Below are several points of consideration to narrow the choice for selection:

- **How do you justify having chosen Community A rather than Community B?**
- **Is ICT access and literacy an important criterion for selecting the community?**
- **Is ICT service or product an important must-have in the project, to elevate the current problem, demand or context of living in the selected community?**
- **Are there any previous record or experience within the community where ICT has been used community-wide to solve a problem they face? What was the rate of success, or failure, of the previous project(s)?**
- **What are the significant impacts notably observed through previous ICT projects?**

1.1. PROJECT ORGANIZATION

The first step to begin the project with the rural community is to prepare a proposal. If there is a funding agency available, Upon approval, a budget or further management commitment for the project may also be required before an individual is assigned to begin work and lead the project, and before the project is authorized to progress to Project Initiation.

In cases where the selected community has its own leadership management team, there is a need to prepare a set of project proposal for the community's management team, in order to obtain support and acquire agreement from the leaders of the community. Local leadership is essential in driving the success of the project, as it will lead to the sustainability of the project. Sustainability of ICT projects for rural communities will be further explored in the sixth chapter in this handbook.

1.2. CONDUCTING A NEEDS ANALYSIS

Before designing and developing, or making a decision about an ICT solution to a rural community, it is crucial to first identify the needs of this community. These needs involve the long-term goals towards better economy, human development and sustainability. Without identifying these needs, it would be very useless to start a project introducing ICT solutions to the community. The solution offered would be irrelevant to the community and the resources spent on the project would be a waste.

One of the most useful methods to find out the needs and characteristics of a community is through conducting a needs analysis survey.

WHAT IS NEEDS ANALYSIS?

Need Analysis is the process of identifying and evaluating needs in a community or other defined population of people. The identification of needs is a process of describing "problems" of a target population and possible solutions to these problems.

Need analysis focuses on the future, or what should be done, rather than on what was done as is the focus of most program evaluations. Some people use the related term "needs assessment".

Extracted from: <https://extension.arizona.edu/evaluation/.../needs.pdf>

In identifying the community needs, a project should begin by looking at the community characteristics, especially the outstanding ones. There are many aspects in the characterization of a community. Some of which are the demographics, geographical locations, economic situations, political landscape and interests, local culture and values, history, education access and priority, etc. For instance, if the selected community is located near a fresh-water lake and aquaculture and ecotourism are the most important sources of livelihood for the people there, then that would mean that it is a need of that community to achieve sustainable livelihood practices that would not cause massive damage to the environment and therefore, harm the aquaculture and ecotourism industries existing within the community.

To begin, these are some questions to lead toward establishing characteristics of the selected community:

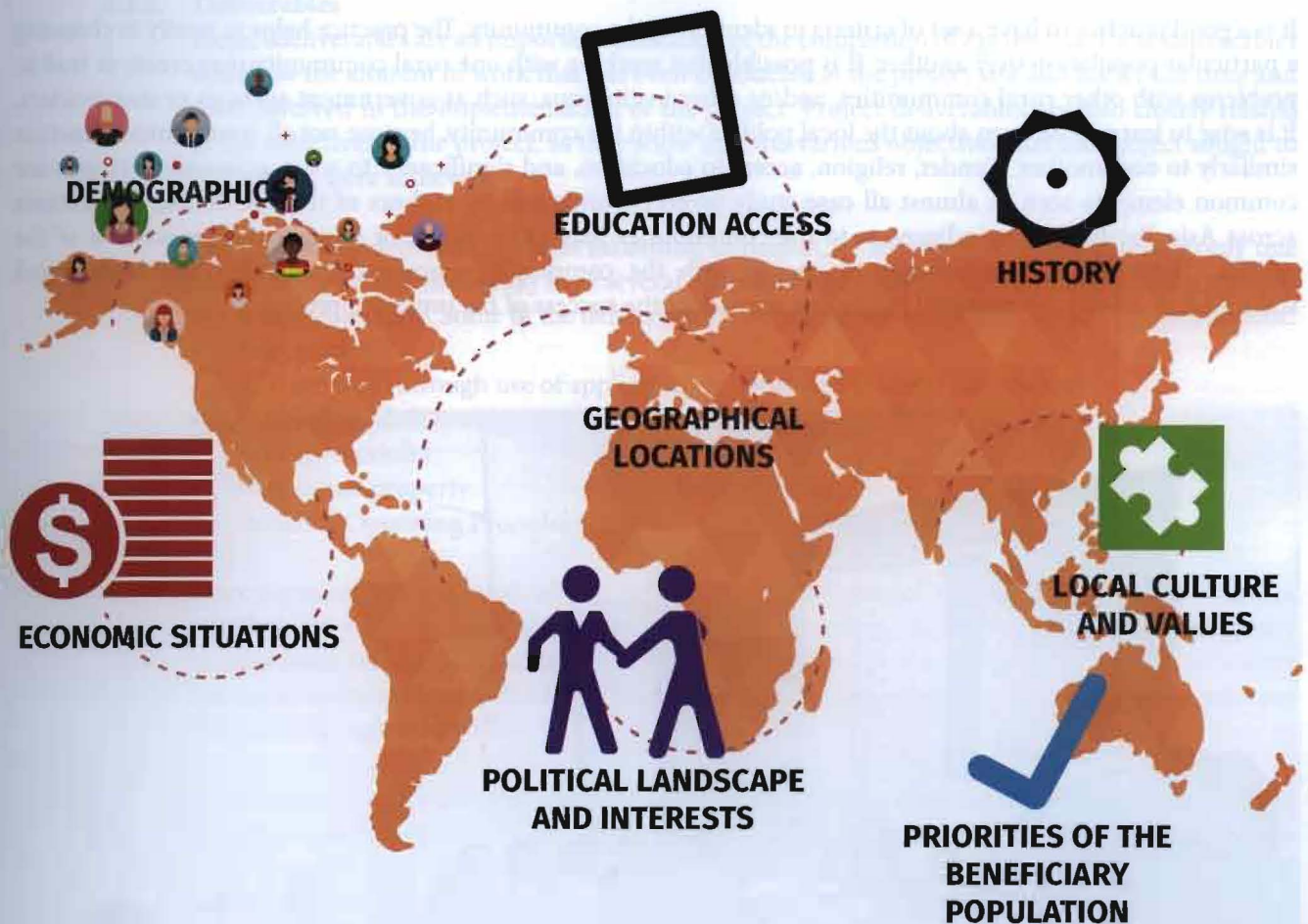


Figure 1 : Characteristics of a Rural Community

- **What are the needs of the community?**
 - Socio-economic
 - Cultural (arts or language)
 - Education
 - Health
 - Any other unique needs identified by the community
- **To what extent has any type of help or assistance been provided by other parties for the rural community? Is there any other assistance planned for the next few years, which may coincide with the proposed project?**

There are various strategies at the disposal of the people leading a community-based project when collecting and verifying these information. The choice of strategies to use very much depends on those responsible for creating the ICT project. Community members would have a lot of very useful information on their community and their contribution to the process of identification of the needs cannot be ignored. Information can be collected from them through interviews, self-report, community consultations, immersive inquiry, questionnaire surveys, artefacts etc. For example, in a case study project rolled out in Bario, Malaysia, community dialogues were held with key community leaders, to ensure that understanding and consent are sought from the very beginning of the proposal for the project. There were also instances where leaders changed positions, and a similar rhetoric had to be repeated to the new leadership line-up, but it was necessary to be done because community buy-in is essential to make sure the project runs as planned, and supported continuously by community members.

It is a good practice to have a set of criteria in identifying the community. The practice helps to justify in choosing a particular population over another. It is possible that working with one rural community may create or lead to problems with other rural communities, and/or other institutions, such as government agencies or stakeholders. It is wise to learn to be open about the local politics within the community, because not all communities function similarly to one another. Gender, religion, access to education, and significance to socio-economic activities are common elements seen in almost all case study projects conducted by authors of this handbook, in locations across Asia Pacific. Issues indigenous to the communities may either boost or hamper the progression of the project. Therefore, it is reasonable to engage with the community members, especially their leaders and stakeholders, to address potential issues that may affect the success of the proposed project.



1.3. FEASIBILITY STUDY

1.3.1. Project scope

Identifying what innovations to use in the ICT Project will determine the kinds of value that can be added to the infrastructure, skills, knowledge and economic activity of the community and its members will help project leaders decide whether the community will benefit fully from the solution to be introduced. There are different ways in identifying the knowledge base, talents and sources of reference for the project, depending on the conditions in the rural community. The project leaders may also encounter certain limitations in the identification process.

1.3.2. Deliverables

Project deliverables are an important indication of the completion of a project, as these deliverables will show the amount of work that has been conducted at the project site and justify the time and costs involved in the implementation of the project. Project deliverables are also closely related to the objectives of the project, as they show that the various objectives that the project sought to accomplish were achieved.

The number of deliverables varies according to project, as some projects may produce only one deliverable whereas others may have several deliverables to show for the work that has been carried out at the project site. Some of the deliverables that can be produced from an ICT project include:

- Telecentre
- ICT services (through use of applications customised through the project)
- Training modules
- Activity modules
- Intellectual property
- Standard Operating Procedure guides

Once a project is completed, all the deliverables of the project are handed over to the various stakeholders such as the community and project funders. It is advised that the budgetary management for the ICT solution is discussed throughout the project thoroughly, to ensure the community understands and is ready to accept the responsibility to maintain the solution provided through the project.

A final report usually accompanies the deliverables, indicating that the project team has completed what it has been contracted to produce. There should be an agreed timeline for the project teams to handover all the deliverables of a project to the stakeholders. The timeline should be discussed, agreed upon and displayed clearly at the initiation stage of the project. If there are changes to be made to the timeline, agreement has to be sought, to enable everyone involved to commit their deliverables in a timely manner. In an ideal situation, deliverables should be produced within 4-6 weeks upon completion of each phase of the project.

1.3.3. Duration

Scheduling is one of the most important aspects of a project, as all the stakeholders will have to know how long the expected duration of the project should be, from the initial start-up to its completion date. A project can be considered to have failed if it cannot be successfully completed in time.

Proper scheduling also allows for proper division of tasks among the team members, and will allow the project manager to duly inform each team member when their services will be needed during the project.

Project managers will have to consider several aspects when planning a schedule for the project, such as:

- The amount of time needed for the solution to be successfully implemented at the site
- The different phases of the project and what expertise will be needed during these individual phases

One useful tool that project managers can make use of to manage and monitor the schedule of the project is by using a Gantt chart. Gantt charts allow project managers to quickly view the overall progress of the project and take necessary action if there are any glitches to the project, ensuring that the project can be completed on time.

- There are several things to consider when setting up a Gantt chart, namely:
- What are all the tasks involved in the project?
 - Who are the people responsible for these tasks?
 - What are the possible problems that may crop up throughout the duration of the project?

Through the setting up of the Gantt chart, project managers will also be able to ensure that all the tasks are distributed to the right people in the team, and that there is ample allocation of time and resources to handle any potential problems that may occur. Using a Gantt chart also allows project managers to view each task according to the levels of priority, and define the task sequence that must be completed in order to deliver the project on time

PROJECT DEVELOPMENT CHART

Phases	Time in Months																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Phase 1:Project Initiation																								
Planning of Project																								
Proposal Submission																								
Needs Analysis																								
Feasibility Study																								
Phase 2: Design & Development																								
Design Project Plan																								
Develop Project Goals & Objectives																								
Design Management Plan																								
Development of Project Activities																								
Develop Project Team																								
Proposal of ICT Solutions																								
Phase 3: Implementation																								
Create a Project Plan																								
Project Execution																								
Phase 4: Monitoring and Controlling																								
Identifying Potential Issues																								
Corrective Action Plan to Control Execution of Project																								
Monitor Ongoing Project Activities Against Planning & Performance Indicators																								
Approval of Any Changes Implemented																								
Phase 5: Closing																								
Closing of Project																								
Handover to Community																								
Preparation of Final Report																								

1.3.4. Resources

Worldwide, many governments, international aid agencies and NGOs have increased efforts in generating rural development by introducing projects such as community-based telecentres in various locations. However, it has been noted that the success of these efforts is very much dependent on the communities involved, as their commitment and sense of ownership of the project can be seen to be the driving force of the sustainability of these projects.

The participation of the rural community in the project is definitely crucial to the success in the implementation of the ICT solution that they are to benefit from. Without their contribution, the ICT solution to be introduced to them will be at best, difficult to implement and at worst, useless. The community members are the primary sources of information for the project leaders in identifying their needs. The more involved the community members are, the better it would be for the project leaders to design the proposed ICT solution for the community. In essence, the solution is at a better standing to empower the community would inherit and own the solution upon the closure of the project.

There are many ways that the rural communities can participate significantly in the definition and design of the project. In identifying these ways, the project can be implemented in the way that can maximize the benefits for the proposed solution for the community. Their participation can also help them familiarize themselves with the ICT solution introduced through the project. They may have input on various concerns on the project and there are different methods of validating these. These inputs can be used to measure the success or failure of the project and it is the task of the project leaders to determine how to use these.

Members of the community may have skills and knowledge base that contribute to the project. By identifying these knowledge and skill sets, the project is able to harness the strengths of the rural community, possibly enabling the tasks to be accomplished ahead of schedule and lowering the costs of implementation, as well as empowering them. For example, in the case study project conducted in Bario, Malaysia, when rolling out a proposed E-Health solution for the community, the researchers were able to transfer the technology solution efficiently to the community members, because there were pensioners who lived in the community who have had experiences visiting doctors to check their blood sugar levels and BMI range. When they were introduced to the E-Health solution, they quickly learned to use the tools, and were able to conduct their own health checks with those living in the same longhouse. The learning curve was notably shorter for those who were used to undergo health checks at locations outside Bario.

Another aspect that is significant to the estimation process in planning for resources for the proposed ICT project is to identify the scope and quantity of socio-economic activities that have already existed in the rural community. It is ideal to address all possible socio-economic activities, and it is sensible to focus on those that would bring the most impact on the rural community. Therefore, there is a need for proper method in identifying these sectors. It is also important for the project leader to ask how the stakeholders are identified because they would be the ones directly interacting with the ICT solution introduced through the project.

1.3.5. Costing

Costing is an integral part of project planning as project managers will have to first determine the estimated cost of implementing the project before they can start looking for funding for the project. Accurate costing estimation will allow for better control over the budget of the project and will give investors an idea as to what to expect from their investment in the project.

Costing estimation will assist in:

- Weighing anticipated benefits against anticipated costs to see the value of implementing the project
- Determining how much funds need to be allocated to support each phase of the project
- Monitoring expenditures based on the estimation to ensure that there are sufficient funds to complete the project
- Estimating the cost of a project is not simple and straightforward, particularly when dealing with a context unfamiliar to the team proposing the ICT solution. There are various factors to consider, to define the reach of the proposed project, such as:
- What is the scope of the project?
- How long is the duration of the project?
- What are the risks that need to be taken into consideration in terms of budgeting?
- Is there any need for contingency plans? If yes, which phase of the project would be critical?
- What are the sources of funding for the project? What are the sources of funding after the project closes?

Developing a project budget is essential to develop a detailed project budget based on the estimated costing. Typically, a detailed budget includes a time-phased estimate of all resource costs for the project and may require revisions while the project is in progress. Some of the details that should be included into the project budget are:



Figure 2 : Project Budget

Managing the project budget is extremely important. The budget determines how well each activity within the project would be carried out. Poor management of funds may also result in the delays, and even cancellations of activities, when executing the project. Any loss of quality of the deliverables and possibly conflicts between the different project team members would impede the success of the proposed ICT project.